Bumblebee (Bombus Latreille, 1802) distribution in high mountains and global warming

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AULO MANINO (*) - AUGUSTO PATETTA (*) - MARCO PORPORATO (*) - MARINO QUARANTA (**)
FRANCESCO INTOPPA (***) - MARIA GIOIA PIAZZA (***) - FRANCO FRILLI (****)

BUMBLEBEE (*BOMBUS* LATREILLE, 1802) DISTRIBUTION IN HIGH MOUNTAINS AND GLOBAL WARMING

(*) *Di.Va.P.R.A. - Entomologia e Zoologia applicate all'Ambiente «Carlo Vidano», Università degli Studi, via Leonardo da Vinci 44, 10095 Grugliasco (Torino).*
(**) *CRA - Istituto Sperimentale per la Frutticoltura, via di Fioranello 52, 00134 Roma.*
(***) *CRA - Istituto Sperimentale per la Zoologia Agraria, Sezione di Apicoltura, via Leonida Rech 36, 00156 Roma.*
(****) *Dipartimento di Biologia applicata alla Difesa delle Piante, Università degli Studi, via delle Scienze 208, 33100 Udine.*

Manino A., Patetta A., Porporato M., Quaranta M., Intoppa F., Piazza M.G., Frilli F. – Bumblebee (*Bombus* Latreille, 1802) distribution in high mountains and global warming.

The planet's global warming is seriously menacing the survival of a lot of species that are particularly demanding ecologically. Bumblebees include a great number of species with a boreal and/or high mountain, and often disjoint distribution, that appear particularly sensitive to climatic variations. Also in Italy the alticolous species could be exposed in future decades to a progressive reduction of their distribution areas. Therefore it seems convenient to check the presence of the most important species of the Alps and Apennines based on recent observations, even if necessarily limited to a small number of valleys or mountain massifs. In particular we took into consideration *Bombus monticola* and *B. mucidus*, present in cacuminal zones of the Apennines and in the Alps, and *B. alpinus* and *B. mendax* living in the higher zones of the Alps.

B. monticola, represented in the central Apennines by the subspecies *B. m. konradini*, appeared rare, poorly spread and limited to elevations above 2000 m, while the subspecies *B. m. hypsophilus* was abundant in the Alps starting from 1450 m; on the contrary *B. mucidus* was observed in the Apennines at relatively low elevations too, much more frequently than in the Alps. *B. alpinus* was found exclusively in few Piedmontese localities above 2100 m, where it was poorly numerous, while *B. mendax*, more abundant and diffused than the previous one, was observed starting from 2000 m in the central eastern Alps and from 2200 m in the western Alps.

A rise in temperature represents a serious danger for the Apenninic populations of *B. monticola* and *B. mucidus* that risk the extinction for the lack of suitable areas for their survival, while the Alpine species do not seem endangered. The situation of *B. alpinus* and *B. mendax* would seem less compromised, even if a rising of the lower altitude limit of their distribution area would mean a drastic reduction of it and the consequent formation of small isolated populations.

KEY WORDS: Apidae, Alps, Apennines, climate change, endangered pollinators.

INTRODUCTION

The climate change occurring in our planet is obvious and universally recognized. Though the causes determining it remain uncertain and above all the amount of which imputable to human activities, everybody agrees to consider that the consequences of this will be particularly negative for the conservation of biodiversity. Among the effects forecasted, a particular concern is the thermic increase that will involve by the way a drastic decrease of habitats fit to host the species of cold climates. Among these we can include the bumblebees that are concentrated in a great number of species in the circumpolar zone and in the main European, Asian and American mountains.

In Italy 31 species have been identified, belonging to the genus *Bombus*, and all present in North Italy, only 17 in central and South Italy, 10 in Sicily, and 4 in Sardinia. Of these, 5 do not have any subspecies, 7 are represented only by the nominal subspecies, while the remaining 19 ones are present, as far as we know today, with 51 subspecies, and altogether there is a total of 63 *taxa*. Some species, also thanks to the presence of more subspecies, are widespread throughout Italy, from the plains to the highest elevations, while others are present exclusively in mountain areas. However the number and the distribution of the subspecies have not yet been object of an exhaustive study.

Alticolous species are adapted to high mountain environments due to their short life cycle and gyne ability to withstand long overwintering periods; therefore they would be affected by global warming with a shifting towards higher altitudes and a progressive reduction and fragmentation of their distribution areas. Therefore it seemed necessary to verify the presence of some relevant species of the Alps and the Apennines considering the most recent observations, even if they are of course limited to few valleys or mountain massifs.

MATERIALS AND METHODS

The following species have been taken into consideration: *Bombus alpinus* (Linnaeus, 1758), *B. mendax* Gerstaecker, 1869, *B. monticola* Smith, 1849, and *B. mucidus* Gerstaecker, 1869.

The first two species were chosen for their presence in the Alps only at very high elevations, and the other two because they were recorded, besides in the Alps, also in the cacuminal areas of the Apennines; other species found in high mountains, but spread with a wider altitudinal range, were not included in this survey because they are presumably less threatened by global warming.

To define the diffusion of the examined species we refer-

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